MAF sensor probe – a greener way to repair. 10

DELPHI

TechTalk

DELPHI'S MAGAZINE FOR AUTOMOTIVE TECHNICIANS

FALL/WINTER 2010/2011

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Innovation for the Real World

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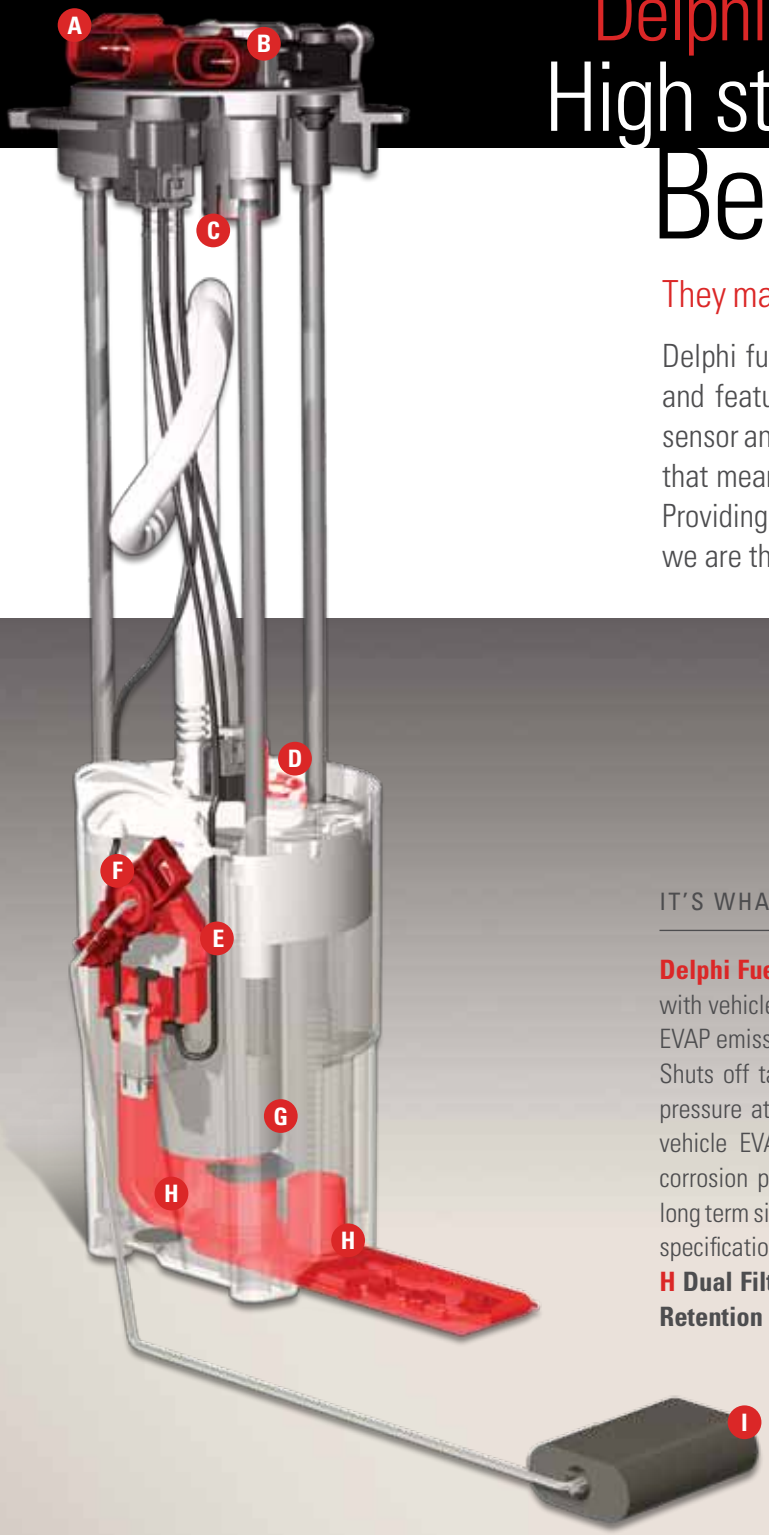
Innovation for the Real World



Delphi fuel pumps. High standards. Below the surface.

They may look the same, but all parts are not created equal.

Delphi fuel pumps deliver fast-pressure rise for quick engine starts and feature internal springs, an integrated OE fuel vapor pressure sensor and two-strainer system for long-lasting durability. What does that mean? Reliable fuel pumps you, and your customers, can trust. Providing you with the benefit of more than 100 years of OE heritage, we are the company that makes the parts cars are born with.

IT'S WHAT'S UNDERNEATH THAT SETS DELPHI APART

Delphi Fuel Module // **A Improved Connector** Enhanced electrical connection with vehicle harnesses; **B OE Fuel Vapor Pressure Sensor** Confirms to ECM the EVAP emissions systems is performing to specifications; **C Fuel Level Vent Valve** Shuts off tank fill nozzle; **D Integrated Fuel Pressure Regulator** (1)Maintains pressure at fuel rail (2) Negates fuel return from engine compartment to reduce vehicle EVAP emissions; **E Noble Metal Fuel Level Sensor Grid** Improved corrosion protection; **F High Durability Fuel Level Sensors Wiper** Improved, long term signal integrity; **G Quieter OE Turbine Pump** Performance matched to OE specifications and noticeably lower noise levels – 5 to 10 dB lower – in the cockpit; **H Dual Filtration** Improved pump durability; **I Approved OE Float Materials & Retention** Designed to last over the life of the vehicle in all fuel types.

THE PARTS CARS ARE BORN WITH

delphi.com/am

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DELPHI TechTalk

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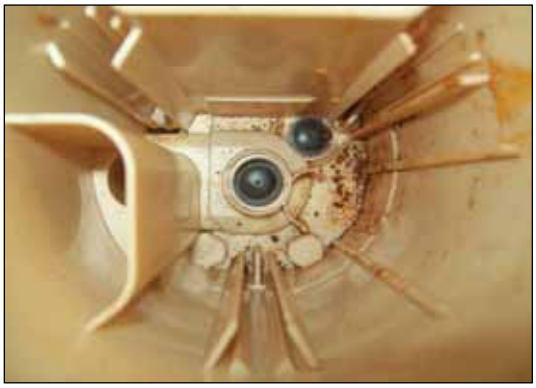
Delphi's proven OE compressor technology available on more applications. **12**



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Taking the pressure out of choosing the right fuel pump. **20**

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The difference is in the valves.

Write to *Delphi TechTalk*

We want to hear from you! Tell us your Delphi story. If we print your letter, we'll send you a Delphi hat. It's that simple! Send e-mail to: **pamela.l.marko@delphi.com** or mail to **Delphi, 5820 Delphi Drive, Troy, MI 48098 c/o Pamela Marko**.

Please include your name, address and daytime phone number. Send photos if applicable. Letters may be edited.

To let *Delphi TechTalk* know you moved, please e-mail **pamela.l.marko@delphi.com**.

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DPSS-10-E-113

Delphi Launches New Global Advertising Campaign and Website

'High Standards, Below the Surface,' advertising campaign and website based on technician feedback.

Who is Delphi?

We Are the Company that Makes "The Parts Cars Are Born With"

- We understand vehicles because Delphi serves the top 25 global vehicle manufacturers as a leading Tier 1 supplier.
- We know each vehicle's DNA and apply our OE engineering and high quality standards to our aftermarket parts.
- We provide OE-based, leading diagnostic tools and advanced training.
- You can trust the company who makes "The Parts Cars Are Born With." Delphi.

Delphi announced the launch of its new 'High Standards, Below the Surface' global advertising campaign, as well as its redesigned global website. Both brand initiatives were the result of market research, customer feedback and technicians insight on how Delphi could better service its audience. The website is currently active and the advertising campaign was launched in October issues of trade magazines.

Advertising

The creative research launched in April 2010 with global WD, counterperson and technician focus groups to gather honest and constructive feedback on Delphi's brand perception in the market, as well as the current and proposed advertising creative and messaging.

"We are excited to launch our global 'High Standards, Below the Surface' brand campaign to the market," said Carrie Wright, vice president, brand and communications, Delphi Product & Service Solutions. "The results are the foundation for the 'High Standards, Below the Surface' campaign. We are opening the door for technicians to see what is inside our parts, demonstrating our understanding of vehicles and their DNA, as the company that makes the parts cars are born with."

Focus groups were conducted in China, Argentina, United Kingdom, Poland and the United States (Los Angeles and Chicago). The feedback was remarkably similar in all areas tested — it was what was underneath the surface of the parts that differentiated Delphi from the competition.

New Delphi fuel pump ad

The new Delphi website at delphi.com/am

Website

The new Delphi website (delphi.com/am) provides a vibrant new design, more engaging content, as well as improved usability and navigation. Based on Delphi's award winning corporate site, winner of at least one annual industry honor since 1997, the redesigned aftermarket site features the latest company news, in addition to information on the company's extensive portfolio, including fuel management, engine management, heating and cooling, and Diesel products, its tooling and diagnostics and training services. Information on Delphi latest promotions and motorsports involvement is also featured.

"The launch of the global site represents a significant step forward for Delphi," said Wright. "Our customers and their needs are vital to us. This website reflects our commitment to keeping them informed with relevant and current information." TT

SPEED™ Features Innovative Delphi Technology

Includes visit from Alan Gustafson, crew chief of the No. 5 Delphi Chevrolet

Delphi has teamed up with Two Guys Garage and Truck U on SPEED™ to provide products for each show's on-air, aftermarket repairs ranging from air conditioning service to fuel pump replacement.

The Two Guys Garage episode premiered Sunday, October 10, 2010 at 9:00 a.m. EST and featured a 2006 Toyota Tacoma requiring repairs to its air conditioning system. Delphi products used for the repair included its SP compressor, blower motor and planar oxygen sensor.

Truck U premiered Sunday, October 17, 2010 at 8:30 a.m. EST with special guest, Alan Gustafson, crew chief of the No. 5 Delphi Chevrolet. Alan provided expert commentary as the hosts service a 2005 Chevrolet Silverado with starting problems. Repairs were made using a Delphi fuel pump, ignition coil, wire set and more.

Top: Two Guys Garage.
Bottom: Truck U with special guest Alan Gustafson (left)

In addition to the premieres on October 10 and October 17, the shows will be repeated on SPEED during October, November and December. Please check local listings for exact times. TT

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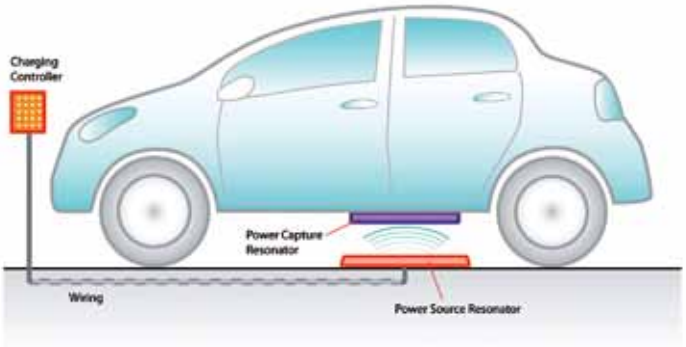
Electric Vehicle Wireless Charging a Reality

Revolutionary green technology to help advance the establishment of a global infrastructure for electric vehicle charging.

Delphi Automotive has reached an agreement with WiTricity Corp., a wireless energy transfer technology provider to develop automatic wireless charging products for hybrid and electric vehicles. The collaboration between the two companies will help establish a global infrastructure of safe and convenient charging options for consumer and commercial electric vehicles.

The wireless charging system would involve no plugs or charging cords. Drivers would simply park their electric vehicle over a wireless energy source that sits on the garage floor, or is embedded in a paved parking spot. The system will automatically transfer power to the battery charger on the vehicle.

The wireless system can already transfer more than 3,300 watts — enough to fully charge an electric car at the same rate as most residential plug-in chargers.



Delphi also makes a Portable Electric Vehicle Charger that fits conveniently in the trunk of an electric vehicle. The user-friendly, UL-listed charging system plugs into any standard 120-volt outlet to enable safe electric vehicle battery charging at home or away. The charging unit can also be integrated into stationary charging applications. TT

Technicians Win Experiences of a Lifetime.

Weekly and Instant Prizes Still Available. Sign Up Now!

Dave Bausinger and his son, Michael, from Dave's Pro Auto Service in Williamsport, PA, posing with Mark Martin, driver of the No. 5 Delphi Chevrolet.

Winner #1 — Mark Martin Photo Shoot

Dave Bausinger of Dave's Pro Auto Service in Williamsport, PA, was the winner of the first grand prize in Delphi's 2010 Destination: Victory Lane. As the prize, Bausinger and his son, Michael, travelled to the Hendrick Motorsports facilities in Charlotte, NC, to attend Delphi's daylong photo shoot with Mark Martin, driver of the No. 5 Delphi Chevrolet and his crew chief, Alan Gustafson.

In addition to meeting Martin and Gustafson, the Bausingers participated in the photo shoot, took tours of Hendrick Motorsports and nearby Charlotte Motor Speedway, watched the teams practice pit stops, and also received autographed memorabilia. Their one-of-a-kind experience included a behind-the-scenes look at the Hendrick team's design studio, body shop, engine shop and race prep facilities.

"This trip was a once-in-a-lifetime event for us."
– Dave Bausinger

During the photo shoot, Mike Bausinger pitched in as Mark Martin's stand-in while the crew prepared the set. "This trip was an once-in-a-lifetime event for us and I thank Delphi for making it happen," said Dave Bausinger.

Winner #2 — AAA 400 Race

Scott Johnston of Complete Auto Repair in Lubbock, TX, was the second winner of the four grand prizes. Scott received a three day, two night trip for four to the Chase Race in Dover, DE, home of the Monster Mile. The trip included airfare, hotel accommodations, rental car, cash for meals and incidentals, plus tickets to the race including pit passes.

Left to Right: Dennis Prince, Mark Martin with Scott Johnston and Ted Pisarski of Complete Auto Repair in Lubbock, TX.

Charles Hopper (right center) of Hop's Radiator Repair in Shelby, N.C., with his family at the Speedway Club.

Scott brought his son, Tim, and guests Ted Pisarski and Dennis Prince. In preparation for the event, Delphi sent a package of Delphi branded merchandise to Scott including die-cast No. 5 Delphi cars, duffel bags, stadium seats, hats and more. They also received specially-designed piston heads engraved with their names, the date and location of the race identifying them as Honorary Pit Crew Members.

On race day, the winners joined Delphi in their exclusive hospitality area for breakfast and lunch where they met Mark Martin, received his autograph and had photos taken. Prior to the race, a Hendrick Motorsports representative gave them a guided tour of Mark Martin's race hauler. They were then brought down to pit road for a pre-race photo with Mark Martin next to the No. 5 Delphi Chevrolet. As an added bonus, Scott and guests stood on pit road with Mark Martin's pit crew during the National Anthem before settling in to watch the race.

"This was better than winning the lottery and it cost me nothing but a few moments to enter on Delphi's Destination Victory Lane website," said Scott Johnston. "Delphi treated me to a trip I never dreamed I'd be able to experience. I've bought Delphi parts in the past and now I'm an even bigger fan."

Winner #3 — Bank of America Race

Charles Hopper of Hop's Radiator Repair in Shelby, N.C., was the third winner of the four grand prizes. Charles received a three day, two night trip for four to the Bank of America Charlotte Race in Charlotte, N.C. The trip included airfare, hotel accommodations, rental car, hospitality, cash for meals and incidentals, plus tickets to the race including pit passes.

Charles and his family were also treated to dinner at the exclusive Speedway Club, as well as received admission to the NASCAR Hall of Fame.

Winner #4 — Homestead/Miami Race

David Sills and three guests won a race weekend in Miami and got to see the closest finish in Sprint Cup Championship history as Delphi-sponsored Jimmie Johnson won his record-setting fifth championship in a row. David's prize included race tickets, transportation to and from the Homestead/Miami Raceway, hotel accommodations on Biscayne Bay, Delphi-branded race merchandise and more. TT

Did You Know?

Delphi OE quality fuel pumps and modules are based on more than 30 OE-proprietary innovations, and 150 patents in fuel module and pump design.

Prizes Still Remain!

Weekly Prizes

- 42" Plasma TVs
- Delphi Shop Stools
- Delphi Duffle Bags

Instant Prizes

- Delphi Replica Race Cars, Lunch Coolers, Stadium Seats and $20 BassPro Gift Cards

No purchase necessary. Sign-up or log-in today at: **delphi.com/victorylane**

Left to Right: William Terry and David Sills of BRB Auto Repair in Virginia Beach, VA and their friend Olin David Martin

Delphi Expands Product Portfolio to Meet Technician Needs

Delphi fuel module & hanger/sender

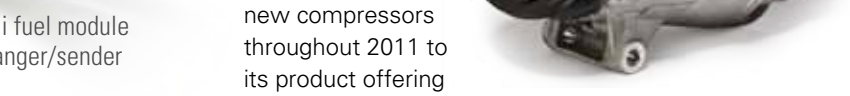
Fuel Expansion

Delphi continues to lead the industry with the broadest OE offering coverage on its cost competitive fuel pumps and modules. Similar to the ignition coil, Delphi fuel pumps perform under pressure. Delphi fuel modules deliver fast-pressure rise for quick engine starts and feature internal springs, and integrated OE fuel vapor pressure sensor and two-strainer system for long-lasting durability. In 2011, Delphi will expand its fuel pump offering to 81 percent carparc coverage with more than 80 new part numbers for an additional 25 million vehicle applications.

Oxygen Sensors Expansion

Delphi continues to manage its competitively-priced, oxygen sensor program to maintain 95 percent coverage. This includes its advanced planar technology, adapted to fit older vehicles, which provides three times more planar coverage than the next leading competitor. By utilizing planar technology, Delphi is able to offer greater coverage with fewer SKUs, so stores can stock the appropriate parts to save money in inventory, but also have the right part available when technicians are in the middle of a repair.

Delphi planar technology delivers the industry's fastest light off time to reduce cold start emissions and is tested for durability up to 150,000 miles.



Delphi planar oxygen sensors

Compressors Expansion

Delphi CVC compressor

Delphi is scheduled to introduce 25 new compressors throughout 2011 to its product offering which will cover some of the most popular Ford, Chrysler, GM, Honda, Toyota and other import vehicle applications. These parts numbers, utilizing Delphi OE technology, will include more than 16 million vehicles in carparc from 1998 to current model year.

Standard to all Delphi products, Delphi compressors undergo a stringent validation and testing process to ensure the part in the box will perform to the OE specifications. In fact, Delphi CVC compressors have a proven warranty experience of less than one Incident Per Thousand Vehicles (IPTV) on major OEM applications. TT

A Revolutionary Diesel Fuel Analyzer for Quicker Onsite Results

Includes unique sensing techniques to eliminate need for costly, ongoing cartridge replacement.

Delphi has launched its innovative new fuel analyzer, the first of its kind offering workshops, garages and fleets real-time analysis of fuel content in the workshop at a more affordable cost.

As a leading OE manufacturer of advanced diesel fuel injection systems, Delphi has been quick to recognize the increase in fuel related issues. Until now, options have been limited, with most workshops choosing to send samples to a specialist laboratory for analysis, costing both time and money. The new solution uses unique sensing techniques, eliminating the need for ongoing cartridge replacement, and ensuring a competitively superior product.

Independent research has revealed that up to 80 percent of diesel engine problems stem from contaminated or poor quality fuel," said Philippe Desnos, global marketing director, Delphi Product & Service Solutions, Diesel. "Running vehicles on sub-standard fuel can lead to performance issues such as filter plugging, injector coking, piston ring sticking and breaking. Such problems need to be identified at the earliest possible opportunity in order to minimize longer term damage to the engine. Immediate and accurate analysis of the fuel is therefore critical."

Seen as key in tackling climate change, biofuels are becoming increasingly popular in North America. However, because the physical and chemical properties of bio components are significantly different to conventional fuels, they are considered to be more susceptible to contamination, and therefore more care must be taken in their use. The American fuel standard ASTM D 975-09 allows the blending of up to 5 percent biofuel with conventional diesel — B5. Blends in excess of this are not recommended by the fuel injection equipment manufacturers and may invalidate warranty, because of the increased risk of fuel system related issues. Until the launch of Delphi's fuel analyzer, there has been no way of checking that the fuel meets the American standard quickly and cost-effectively.

Using the new Delphi fuel analyzer, technicians will be able to quickly specify the level of biodiesel in the fuel sample and identify impurities, such as non-refined vegetable oils and petrol, helping them to assess whether contaminated fuel is the root cause of a potential fuel injection issue.

Incorporating patented electronic technology, the hand-held unit provides workshops and garages with real time analysis via a digital display screen. The volume of fuel required to undertake the analysis is only 46ml, which can be retrieved from the fuel pump or filter. This will allow technicians receiving only system components to diagnose impurities just as easily as those working directly on the vehicle.

The complete fuel analyzer kit from Delphi also includes a USB cable, a mains adapter, three 50ml measuring tubes, a 'Quickstart Guide' and a CD with a complete user manual and reporting software. TT

Did You Know?

We log more than 78,000 minutes annually on service calls to address questions.

Need assistance? Get the answers you need by calling
[1] 877.GO.DELPHI
[1] 877.463.3574

Delphi MAF Sensor Probe

A Greener, Wider-Coverage, Money Saving Approach to Repair.

The Delphi new mass air flow (MAF) sensor probe is an alternative to the traditional repair and provides unique benefits resulting in costs savings, more shelf space and easy installation. In most cases it's unnecessary to replace the plastic housing of the sensor since it's usually the actual sensor probe that fails 98 percent of the time. Delphi's innovative alternative allows the technician to focus on the part needing replacement.

Why Delphi MAF Sensor Probe?

- Stock one Delphi part to fit almost eight million passenger car and light truck applications, including import and domestic late-model vehicles. The Delphi MAF sensor probe combines six OE Service MAF sensor SKUs into one Delphi MAF sensor probe for reduced inventory. The dealer and competitors require six SKUs.
- Replace OE with OE. The Delphi MAF sensor probe is not remanufactured and boasts all new components designed and manufactured by Delphi. This ensures a correct ECM interface.
- Saves money by eliminating the need to replace the plastic housing.
- It's a greener repair solution; eliminates replacement of plastic housing, and is packaged in a biodegradable plastic box. TT

Follow these step-by-step instructions on how to repair and replace the MAF sensor probe.

Once it's determined the mass air flow sensor requires replacement, the same servicing procedures are followed to remove the failed sensor assembly. Inspect the flow tube to ensure there are no cracks in the plastic housing. If there are, you will need to replace the entire unit – not just the probe. Is the flow tube free from cracks? Then look below to learn how to replace the MAF sensor probe. Once the sensor probe is replaced, continue re-installing the completed MAF sensor assembly into the vehicle as you would normally.

1 Place MAF assembly on clean workbench with center slot facing up.

2 Remove product key from bottom of new sensor probe package.

3 Place key into center slot of MAF sensor assembly. Tab on product key should be nearest to connector side of slot. Gently depress product key in slot.

4 Insert small 1/8" screwdriver into gap between circular rim on flow tube and sensor. Pry on sensor rim until o-ring is out of flow tube.

5 Remove product key and slide out old sensor by grasping connector. Discard old sensing element.

6 Carefully open sealed new sensor package. Handle sensor connector only (NEVER touch electronics as this may damage sensor probe). Slide new sensor probe into flow tube with latch tang up toward slot end of tube.

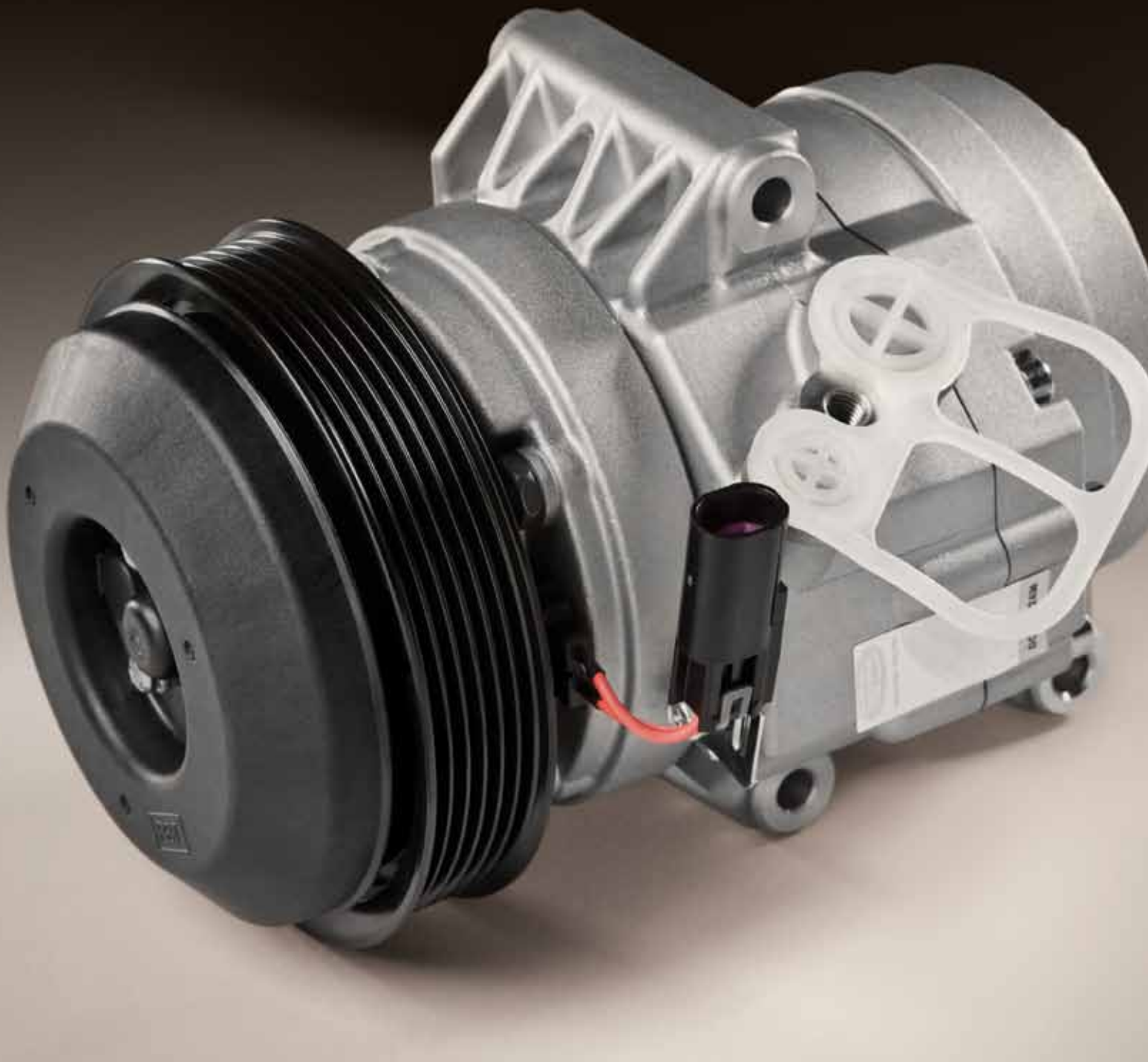
7 Place MAF assembly on bench with connector down and push firmly on flow tube to seat and latch sensor probe. Listen for the click.

Interested in Learning More? View our detailed video demonstration at **delphi.com/victorylane**

Delphi Engineers its

OE SP Compressor Technology

for Broader Application



Delphi aftermarket SP compressors validated to meet or exceed OE specs.

When Delphi introduced its SP compressors earlier this year, the product line was developed based on Delphi's innovative SP technology used by major OEMs worldwide. But Delphi did more than bring Original Equipment (OE) engineering and design expertise to the aftermarket. It applied the same stringent validation, testing and manufacturing processes it does to every component it produces.

"Whether it's engineered and designed for OE production or an aftermarket application, every Delphi part must adhere to the company's global technical requirements," said Mark Shasteen, vice president, global service and engineering, Delphi Product & Service Solutions. All parts released for the aftermarket undergo the same rigorous product development processes including Production Part Verification (PPV) and Production Part Approval Process (PPAP) according to Shasteen.

The purpose of PPV is to confirm the part being produced performs exactly as the prototype was designed; and the purpose of the PPAP is to ensure every part meets all of the requirements defined in the engineering samples. What's more, any plant manufacturing a Delphi part must adhere to all of Delphi's manufacturing standards to include performance, noise and durability testing.

"Unlike some competitors in the aftermarket, Delphi has a validation and durability test schedule to ensure its products perform in the most extreme conditions vehicles would experience," said Shasteen.

More than a decade ago, Delphi created its exclusive compressor life-cycle test based on data from cars driving in real-world conditions, including personal vehicles, taxi fleets and police fleets. After recording the conditions the vehicle compressors were exposed to, Delphi standardized its durability test schedule, which is used for its OE and aftermarket compressors.

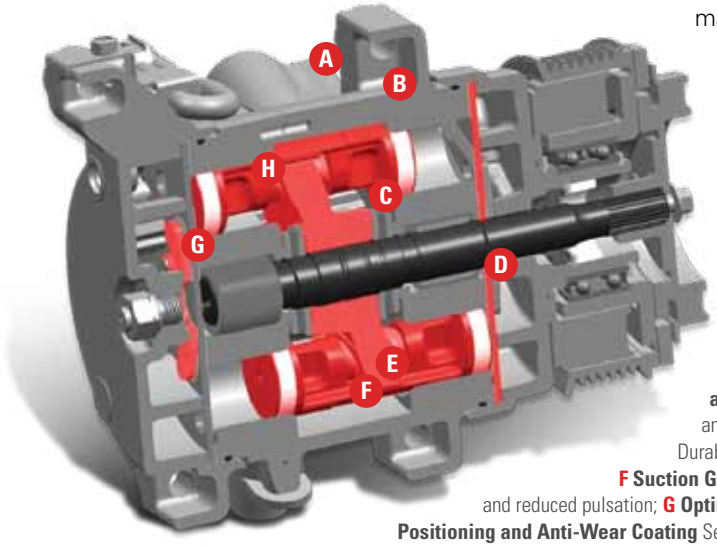
"Because we have the benefit of more than 100 years of OE heritage, Delphi always engineers, develops and tests parts this way."

– Mark Shasteen

Delphi's SP compressors were tested to Delphi's durability requirements and met the demands of completing the test without exhibiting excessive wear. The SP compressors also meet the designated performance requirements and exceed the Delphi requirement that calls for a noise differential of less than 3 dB. In addition, Delphi's SP compressors underwent vehicle fit and leak testing to ensure Delphi-caliber quality.

Delphi's new compressors fit popular late-model domestic and import applications, with coverage for more than 13 million vehicles.

Since 1910, Delphi has brought heating and cooling innovations to the automotive market, and remains a leader in developing OE-quality solutions for vehicle manufacturers and the aftermarket. This includes the first automotive radiator in 1911, the first car heater in 1929 and the first underhood A/C system in 1954. TT



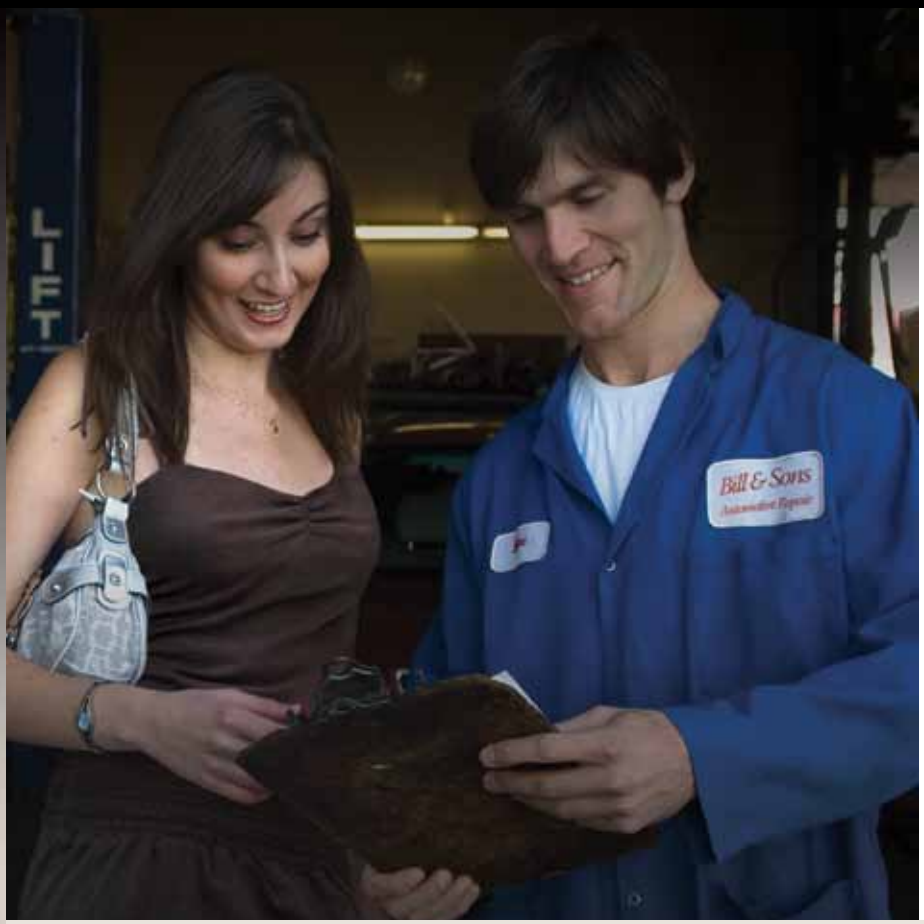
SP COMPRESSOR // FEATURES & BENEFITS
A Integrated Muffling Decreased discharge gas dynamics; **B Pair Machined Cylinder Bores** Decreased noise; **C Higher Capacity Thrust Bearing to Support Axial Load** Reduced noise even at high speeds; **D Long-Lasting Radial Bearings and Optimized Clearance** Reduced Noise, Vibration and Harshness (NVH); **E Machining Finish and Coating** Durable wear resistance, and improved noise reduction; **F Suction Gas Flow Through Crankcase** Maximum lubrication and reduced pulsation; **G Optimized Valve System** Diminished NVH; **H Improved Positioning and Anti-Wear Coating** Secured, smooth operation.

Did You Know?

Delphi manufactured the first underhood air-conditioning system in 1954.

Reduce Comebacks

Delphi Fuel Pump Failure Analysis.



What can a failed part tell you? A lot... It tells a story. Take the following fuel pumps below. These failed pumps were not a result of incorrect testing. All tests performed were valid and provided useful data for making a diagnosis, but more could have been learned. Were they worn out or did they fail for another reason?

The answers to these questions are important and without them, an accurate diagnosis is left to chance, inviting future problems for you and your customer. A failed-part analysis should always be conducted on failed fuel modules through close visual examination and some simple disassembly. Avoid a potential customer comeback with these simple steps.

First Checkpoint

Examine the electrical connectors closely and look for evidence of terminal overheating, especially at the terminals supplying current flow to the fuel pump inside the module. Badly charred and burnt terminals are easy to spot, but seemingly undamaged connections should be checked more closely for evidence of melting or bubbling near the electrical terminals.

Any melting is an indication of excessive heating due to a poor electrical connection caused by a damaged vehicle body harness. If this type of damage is found, poor pump performance will occur due to this bad connection. The vehicle's electrical connector must be replaced or repeat failures will occur.

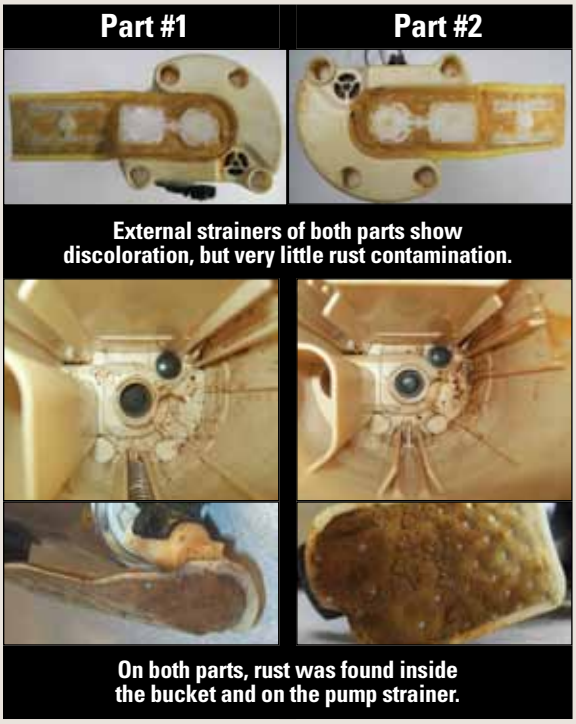
Second Checkpoint

Examine the external strainer on the fuel module. Look for signs of dirt and/or rust contamination. Any form of dirt

Intermittent starts due to bad vehicle wiring

The vehicle shown below received three fuel modules over a five week time period. In each instance the vehicle would not start. Sometimes striking the bottom of the fuel tank would cause it to run. All modules were analyzed and failed due to a bad vehicle electrical connector, which had not been replaced in all instances. All three modules were damaged via a burnt fuel pump ground terminal. Although damage is not extreme, it is significant enough to create repeat failures.

All three modules failed due to a burnt "C" terminal, the ground path for the fuel pump.


Part #1
Part #2
External strainers of both parts show discoloration, but very little rust contamination.
On both parts, rust was found inside the bucket and on the pump strainer.

Contamination caused by rusted fuel lines

This vehicle received two fuel modules in less than a week. The reported issue was noisy operation and erratic fuel pressure.

Both modules were analyzed, and the fuel module bucket and internal strainer were heavily contaminated with rust. The external strainers showed some discoloration, but had significantly less rust in them. The cause was a rusted return fuel line.

found in the strainer should immediately trigger an inspection of the fuel tank. A tank cleaning or replacement should be conducted, based on what is found.

It is important to understand how contamination entered the fuel tank so preventative action can be taken to eliminate future occurrences. Areas like the tank vent system should be checked to determine if contaminants entered through this area. If determined contaminants were "pumped" into the tank or intentionally added, it's important to change fuel supplies or add a locking gas cap to the vehicle.

Third Checkpoint

Visually examine the fuel module bucket and internal strainer. Depending on the module design, you may be able to view the module bucket through an opening in the fuel module design. If not, the bucket may have to be removed from the fuel module through disassembly. What is important to note is what has accumulated in the fuel module bucket and internal pump strainer. Contaminants entering the fuel module bucket are indefinitely trapped, so the bucket will contain a contamination history of the fuel module.

A significant amount of contamination found in the bucket and internal strainer is a sure sign that the part failed due to contamination. This indicates that there are other issues on the vehicle that need repair prior to the installation of a new fuel module.

Analysis of Actual Failures

Above are actual scenarios showing failed modules. Since these issues were not identified during the initial diagnosis, the results were repeat failures. On closer inspection, all the needed repairs could have been made the first time. More important, a customer "comeback" would have been avoided. TT

Fuel Pump Installation Checklist

Tips for successful installations and increased customer satisfaction:

- √ For proper installation procedures, consult the appropriate vehicle service manual. Read all instruction sheets included in the kit.
- √ Don't reuse an old strainer. Install a new Delphi strainer.
- √ Install a new in-line fuel filter, if equipped with one.
- √ Closely examine electrical wiring leading to the fuel pump or module for any evidence of heat damage. Replace damaged wiring with new.
- √ If the fuel module has a detached float arm included in the kit, be sure to install it using the instructions provided with the kit.
- √ Inspect the fuel tank and the metal fuel lines for contamination and rust. Clean or replace the tank and fuel lines as needed.

OE or Imitation? Learn to Tell the Difference.

Ignition and Emission Parts.

Did You Know?

Delphi has supplied more than 550 million Multec injectors to its OE customers since 1985.

Designed, engineered and manufactured to deliver consistent, efficient engine performance and fuel efficiency; the complex collection of ignition systems, engine sensor and emission control parts should perform in the aftermarket to the same level of quality, durability and performance standards set by the original equipment manufacturers (OEMs). As a partner to the 25 largest OEMs worldwide, Delphi has the unique advantage of collaborating at the OE level, ensuring its aftermarket products meet the standards originally developed and established.

Unfortunately, this is not always true with other aftermarket manufacturers. While some have introduced engine ignition and emission control system replacement parts, such as Manifold Absolute Pressure (MAP) sensors and ignition coils into the market, these products can be deficient in performance or, as in one case, outright frauds resulting in non-functioning parts. These imitation parts can potentially lead to considerable engine damage and impact a vehicle's ability to operate safely. At least, the use of these parts can have a detrimental effect on fuel economy and overall vehicle operation costs.

Automotive parts distributors, part stores and professional technicians need to be aware not all engine management system parts are created equal. Many aftermarket replacement parts are high quality, performing at or near OEM performance specifications. But how do you identify what replacement parts you're getting?

Below are two examples of aftermarket engine management parts which do not meet OE specifications and reasons why they may not be the best choice.

MAP Sensors

The first is a MAP sensor for popular General Motors (GM) mid-size passenger car and light truck V6 applications. This part is marketed by an off-shore manufacturer and has a list price approximately 75% below established national brands. On an initial visual examination, the part appears to be all right. On closer examination, however, the part reveals the following:

- Missing connector keys
- Non-tapered connectors
- Non-functioning atmospheric "weep" holes

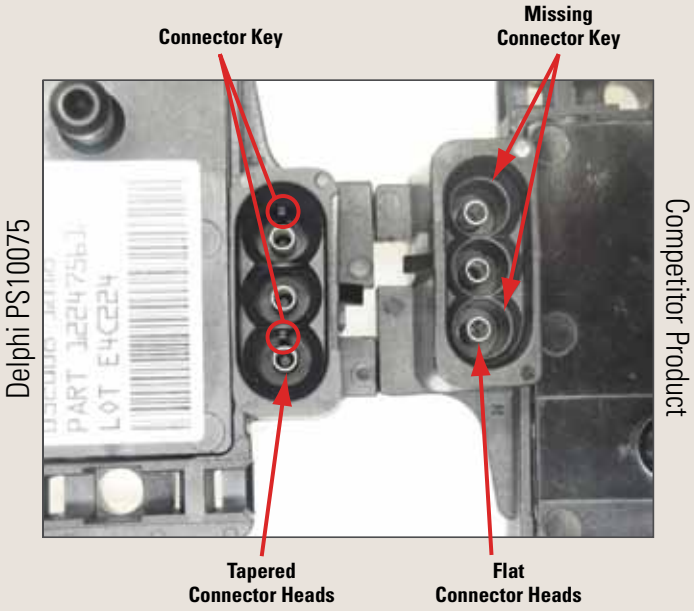
More important, when bench tested, this MAP Sensor failed to measure any atmospheric pressure. Removing the backing plate revealed the contents of the sensor consisted of a looped wire encased in epoxy with a hand-soldered connection. There was no pressure sensing element and no possible interface with the vehicle's engine control module (ECM). This is clearly a non-functioning part.

Installing this MAP sensor on GM vehicles could result in the ECM establishing fuel trim through a default set of parameters, which in turn could possibly impact vehicle performance and fuel economy. Use of this MAP sensor could result in the vehicle not meeting emissions regulations in regions that have emissions standards. The part also does not provide accurate atmospheric pressure information to the ECM.

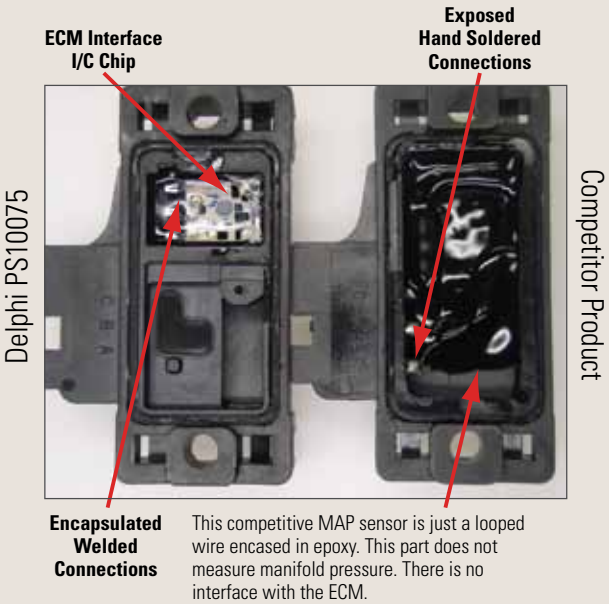
Delphi MAP sensor

Original Equipment Part vs. Non-Compliant Competitor Part

Visual Inspection of MAP Sensor (Mid-Size V6 GM Passenger Cars and Light Trucks)



The connector keys prevent the connector from being mounted backward. The tapered connector heads ensure a weather tight electrical connection.



This competitive MAP sensor is just a looped wire encased in epoxy. This part does not measure manifold pressure. There is no interface with the ECM.

This part's electrical connection will fail as the exposed solder connections are subject to vibration and corrosion.

Ignition Coils

The second engine management part not meeting OE specifications during testing is an ignition coil by a well-known engine management parts manufacturer. The ignition coil is for 2003 – 2009 GM mid-size passenger cars and light trucks with in line six, five, and four cylinder engines with 1.9 million vehicles-in-operation (VIO) footprint. Initial visual inspection revealed a well crafted, good looking reproduction of the original part. However, as with the MAP sensor discussed above, looks can be deceiving.

Six of these competitive coils were analyzed and compared to OE specifications, including 233 hours of thermal cycling, voltage output and "make voltage" limitation testing. As part of the testing process, six Delphi coils for the exact same application were tested alongside the competitor coils.

The results? Delphi's coils met all of the OE specifications, operating parameters and successfully completed the 233 hours of durability testing. The competitor? All six of the competitor coils failed to complete the 233 hour test. Two of the coils actually failed the bench testing before even beginning the thermal cycle test. Further analysis revealed the two coils had internal failures. Three other coils failed after 72 hours and one coil lasted only 96 hours. A failure in this case means the coils had no output or very low output, insufficient to create a spark at the spark plug.

A typical ignition coil operates at 25,000 volts of output voltage. The ignition coil fires when the coil primary current is switched off. A negative voltage is induced when the primary current turns off, a positive voltage is induced when the primary current is turned on. This positive voltage is called the "make voltage." If this make voltage is high enough, and under certain conditions, it could fire the spark plug and ignite the air/fuel mixture in the combustion chamber at the wrong time.

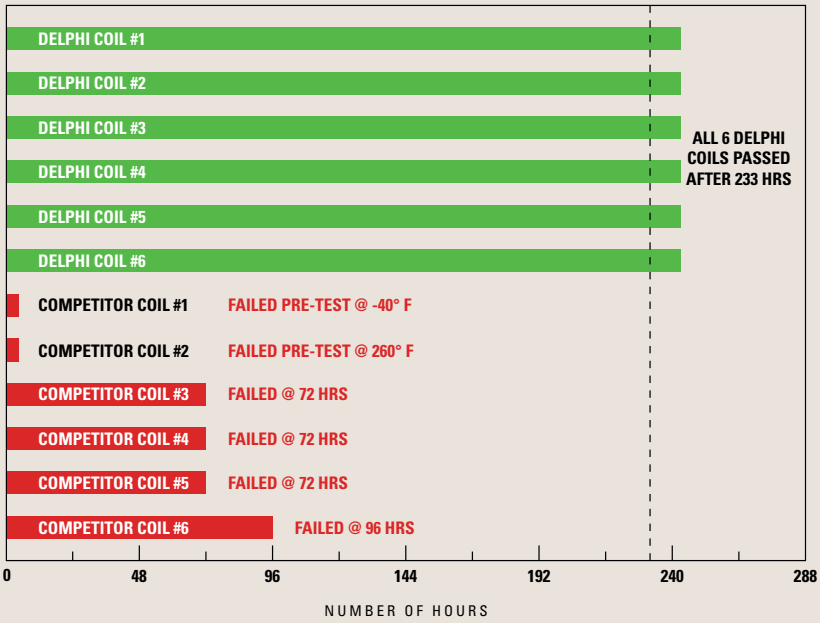
A spark plug firing out of phase with the compression cycle of the cylinder can potentially cause severe engine damage such as breaking or blowing a hole through the top of the piston. Such engine damage is catastrophic, costly and could compromise the safety of the vehicle.

An ignition coil must be designed to limit the make voltage so there is no spark when the primary current is turned on. Therefore, to

Did You Know?

Six Delphi fuel pressure regulator mini-cartridge part numbers represent more than half the sales volume on GM applications, resulting in lower inventory investment.

Ignition Coil Thermal Cycle Test Results



- Six Delphi (GN10114) and six competitor coils were tested.
- All six Delphi coils passed the 233 hour test and still performed to OE specs.
- Two competitor coils failed during pre-test thermal cycle.
- Three other competitor coils failed at 72 hours and one coil failed at 96 hours.

prevent any out-of-phase spark plug firing, the OE specifications call for a maximum of 500 volts of make voltage.

Delphi utilizes a patented design feature called "phased turn-on," which is built into the coil's integrated circuitry to control make voltage to fewer than 500 volts. Without a controlling feature such as Delphi's "phase turn-on," limiting make voltage is a challenge. In fact, the tests conducted on the competitor coils indicated make voltage readings of as high as 1,700 volts – well over the OE specification. The coils marketed by the well known engine management parts manufacturer do not have the capability of controlling make voltage.

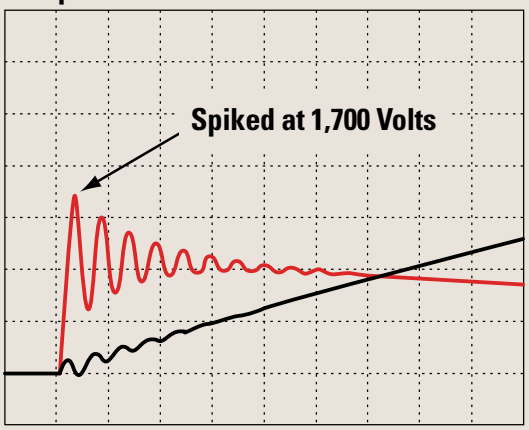
Other observations revealed that the competitor coils required higher operating voltage and current. This causes higher coil operating temperatures and can lead to premature failures. Higher voltage and current also increases electromagnetic interference (EMI) which can negatively interface with the ECM and other internal electrical systems.

Delphi ignition coil (GN10114)

"Make Voltage" Comparison

These Charts Indicate "Make Voltage" Performance (OE Specification Maximum 500 Volts)

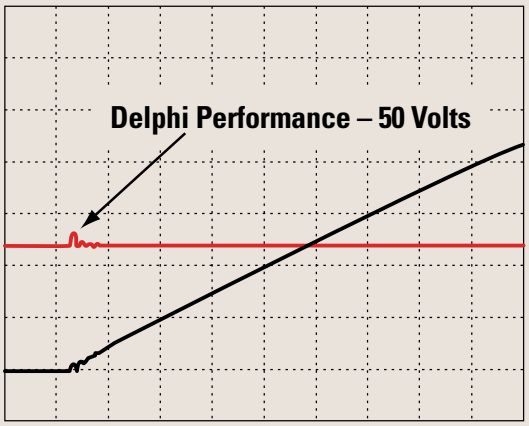
Competitor Coil



Make Voltage (14V supply) | 500V/div

Keeping "make voltage" level low helps prevent firing the coil and igniting the air/fuel mixture at the wrong time. Firing at the wrong time could lead to engine damage.

Delphi Coil



Make Voltage (50V supply) | 200V/div

"Make voltage" low level is achieved through using a patented Delphi feature called "phased turn on."

What does this mean for the technician and vehicle owner?

- Engine performance could decline, especially during hard-to-start situations in cold weather. Decreased fuel economy and the even possibility of severe engine damage caused by uncontrolled and improper spark timing could also occur.
- Part durability may be compromised and fail during operation, translating to increased vehicle comebacks. All six of the competitor coils failed the durability test and two failed bench testing. Higher operating temperatures could also lead to premature coil failure.

The GM engines listed above require one coil per cylinder. If only one or two coils are replaced with the competitor coil not operating to OE specifications, the engine will not be restored to the vehicle's original operating performance.

Recognizing quality replacement parts in the aftermarket can be a daily challenge. It shouldn't have to be.

Unfortunately, with some aftermarket manufacturers the name on the box does not always guarantee a quality part is inside. Saving a few dollars on a less expensive part may end up costing more in the long run if comebacks are higher.

With Delphi, technicians can repair confidently knowing the correct part with the correct system interface is inside each Delphi box. Delphi is committed to upholding the OEMs original specifications in all of its aftermarket parts. TT

Did You Know?

Delphi produced the first Packard ignition cable in the United States in 1901.

Take the "Pressure" Out of Choosing the Correct Fuel Pump

Two of the most common fuel pumps used on GM vehicle applications are the FE0115 and FE0114 fuel pumps. These pumps look similar and, in some cases, fit vehicle applications of the same make, model, year and engine displacement. The difference? A big one. With different fuel injection systems the fuel pressure they produce is vastly different.

The FE0115 is a low pressure pump which produces approximately 12 PSI. The FE0114 is a high pressure pump which produces approximately 62 PSI. Even though these two parts can physically be placed into the same vehicle application, they are not interchangeable due to the large difference in the pressure they produce. An incorrect selection between these two pumps will result in the pump providing the wrong fuel pressure for the vehicle application and a customer part return.

Both pumps viewed from the side are nearly identical in appearance.

S10 BLAZER (V6)

1994	4.3L, 262cid, FI, (W)		
	.....	In-Tank Pump	FE0114
		Strainer	FS0177
	Harness Tag SEP.....	Hanger Pump Assy	HP10004★
	4.3L, 262cid, FI, (Z)		
	.....	In-Tank Pump	FE0115
		Strainer	FS0177
	Harness Tag SEY, SFB, SET...	Hanger Pump Assy	HP10005★
1993	4.3L, 262cid, FI, (W)		
	.....	In-Tank Pump	FE0114
		Strainer	FS0177
	Harness Tag SEP.....	Hanger Pump Assy	HP10004★
	4.3L, 262cid, FI, (Z)		
	.....	In-Tank Pump	FE0115
		Strainer	FS0177
	Harness Tag SEP, SFB, SET...	Hanger Pump Assy	HP10005★
1992	4.3L, 262cid, FI, (W)		
	.....	In-Tank Pump	FE0114
		Strainer	FS0007
	4.3L, 262cid, FI, (Z)		
	.....	In-Tank Pump	FE0115
		Strainer	FS0007

This portion of the Delphi fuel pump catalog shows the 1992 – 1994 Chevy S10, and FE0115 and FE0114 fuel pumps where applicable. The key to success is determining the fuel pressure needs of the vehicle engine first and then selecting the correct pump.

One example where confusion can occur is the 1992 - 1994 Chevy S10 Blazer 4.3 liter V6 and the 1992 - 1994 GMC Sonoma 4.3 liter V6. These vehicle applications are equipped with the same displacement engine, but have two varieties of fuel injection systems, hence the need for the two different fuel pumps, FE0115 or FE0114.

The VIN Z 4.3 liter V6 engine is equipped with a low pressure, throttle body injection system (TBI) and is designed to work with the FE0115 low pressure fuel pump. The VIN W 4.3 liter V6 is equipped with at high pressure central port injection system (CPI) and is designed to work with the FE0114 high pressure fuel pump.

The key to success is determining what type of fuel injection system the truck has and then matching the fuel pump to it. This can be done by identifying the vehicle VIN (Vehicle Identification Number) and comparing the eighth digit in the VIN (either W or Z) to the cataloging data.

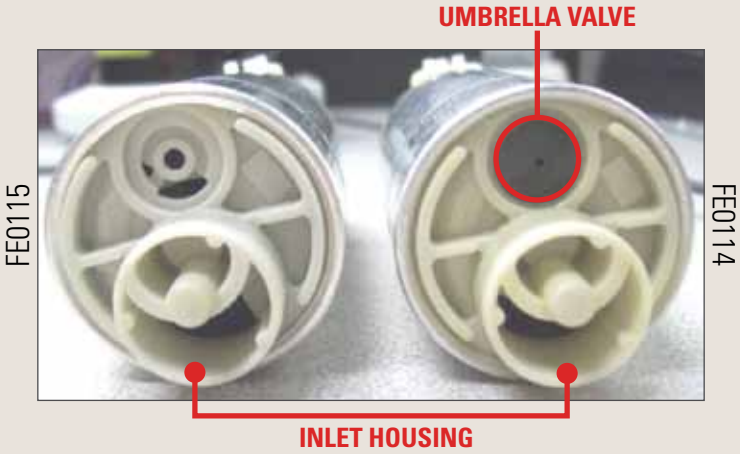
If the VIN is not known, an accurate determination can be made by asking if the truck has a low pressure fuel injection system (TBI), in which case FE0115 would be the correct pump;

If you have further questions to determine the correct fuel pump or fuel module for a vehicle, please contact the Delphi Part Support Tech Line at [1] 877.463.3574 or visit http://go.delphi.com for further information.

or a high pressure injection system (CPI), in which case FE0114 would be the correct pump.

Although the FE0115 and the FE0114 appear similar, there is one simple visual queue to identify the difference. FE0115 does not have an umbrella valve in the inlet housing, while the FE0114 does. This can help distinguish one pump from another after it has been removed from the packaging. TT

The Difference is in the Valves



Both pumps use similar inlet housings, but the FE0115 pump does not use an umbrella valve, while the FE0114 does.

Delphi Proud Member of AASA Know Your Parts Industry Awareness Campaign

The Automotive Aftermarket Suppliers Association (AASA) launched its "Know Your Parts" awareness campaign at AAPEX 2009. The campaign goal is to address the serious threat that low-quality, low-cost automotive aftermarket parts pose to the automotive aftermarket industry – from manufacturer to the consumer.

Delphi is proud to participate in this worthwhile campaign. From advertising to web site links to video and material distribution, "Know Your Parts" encourages the industry to use quality parts from trusted full-service suppliers. Delphi is a committed member to upholding the values of AASA's "Know Your Parts" campaign. For more information, please visit **kyp.aftermarketsuppliers.org**. TT

Did You Know?

Delphi is a proud partner to 25 of the largest vehicle manufacturers globally.

Delphi Expands Training Services to Help Prepare Technicians for Technologies of Today and Tomorrow

Delphi increases training footprint for wider coverage; focuses on best practices and underhood support.

Did You Know?

Delphi offers:

- Leader led training programs
- Self-study programs
- Webinars
- Auto*IQ*
- RepairPoint™
- A technical hotline

Delphi is launching a variety of training and service programs throughout 2011 in its continued support to help technicians in day-to-day repairs, as well as preparation for the future. This includes technology-specific training programs, topical webinars, the addition of four new trainers for expanded coverage and an improved Delphi technical hotline.

"Our new training initiatives reinforce Delphi's main service support goal — provide timely and relevant information to technicians so they can successfully service vehicles," said Mark Shasteen, vice president, global service and engineering, Delphi Product & Service Solutions. "Because of its OE heritage, Delphi knows a vehicle's DNA and can provide critical information to technicians in order for them to effectively compete with the car dealer for the repair, help eliminate comebacks and increase customer satisfaction."

New Training Programs

Because of the continued increase in vehicle electronics repairs, such as hybrid technologies, Delphi announced new four- and eight-hour programs to its 2011 training curriculum to help diagnose and repair these advanced systems. Spanish-speaking courses are available for popular topics and Delphi also expanded its coverage in Canada on select classes.

One new program, available now, is Delphi's controller area networks (CAN) Data and Multiplexing training seminar focusing on the faster and more complex CAN serial bus systems on today's vehicles.

The class covers how to troubleshoot stubborn communications problems with electronic control modules.

New Webinars

Delphi launched its first in a series of monthly webinars in late October. This forty-five minute introduction webinar was free and focused on MODE $06 data analysis and troubleshooting. The webinar helped technicians learn to proactively identify diagnostic trouble codes on marginally performing parts and advise the vehicle owner of potential problems.

New Training Instructors

To address the strong pull from the market for Delphi OE based training, Delphi has added four experienced trainers, Mark DeKoster, Terry DeWaal, Barry Hoyland and Tony Salas, to cover the west coast, mountain and Midwest regions. With a combined 89 years of automotive and training experience, these knowledgeable instructors hold various certifications ranging from ASE Master Technician to ASE L1 and X1 certifications to Mobile Air Conditioning Society (MACS) to Society of Automotive Engineers (SAE).

Expanded Hotline Capabilities

Delphi has expanded its technical hotline (1-800-435-1050) service capabilities to include specific experts for Ford, Chrysler, Asian, GM and European vehicle applications. TT

Intelligent SKU Management Solution to Quickly Select Right Local Product Mix and Lower Inventory Investment

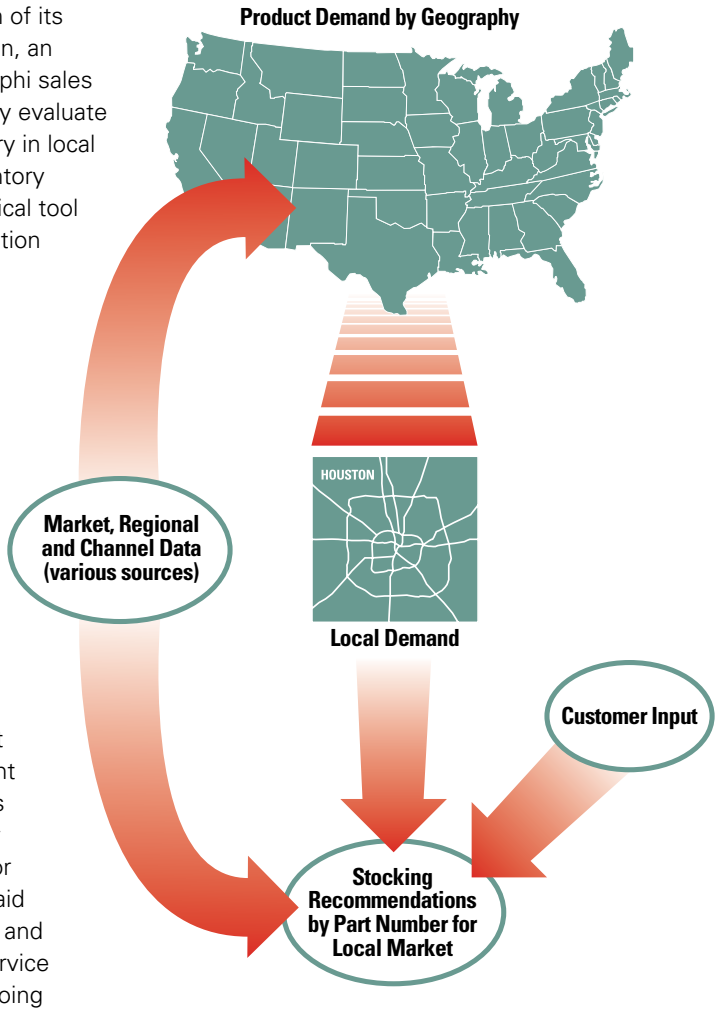
Delphi exclusive tool helps reduce product lead time, improve accuracy and increase sales.

Delphi announced the introduction of its Intelligent SKU Management Solution, an easy-to-use software application Delphi sales teams use to help distributors quickly evaluate and assign the right product inventory in local markets, as well as lower their inventory investment. This user-friendly analytical tool can be used as a stand-alone application or as part of a robust category management process.

The Intelligent SKU Management Solution uses Delphi proprietary research data, market trends and customer-provided information to perform real-time analysis and provide customers with optimal inventory scenarios, plus ongoing support and flexibility to adjust to local market shifts, strategy changes, investment capacity and parts need.

"Speed to market and lower inventory investment are our distinct advantages with the Delphi Intelligent SKU Management Solution. It allows distributors to quickly and accurately assemble their best case scenario for product inventory at a local level," said Brian Altenberger, category, channel and pricing director, Delphi Product & Service Solutions. "Parts proliferation isn't going away and as the electronics within a vehicle continue to expand, it only continues to grow. Our customers need parts availability, but without burdening a warehouse or store with unnecessary part numbers. This is the key to local market success."

Throughout 2010, several pilots were conducted with Delphi distributors to test for program flexibility, speed and accuracy. The results were well received. Currently, the Delphi Intelligent SKU Management Solution is available for hundreds of local markets in the United States and Canada.


Product Demand by Geography
HOUSTON
Local Demand
Market, Regional and Channel Data (various sources)
Customer Input
Stocking Recommendations by Part Number for Local Market

Delphi's tool enhances the category management process with its ability to quickly sort thousands of variables through one tool and receive the right product mix. Due to its agility, Delphi's Intelligent SKU Management Solution is a considered a compliment to traditional category management processes. TT

Did You Know?

Delphi O2 sensors deliver the industry's fastest light-off time (LOT) at six seconds for quicker closed-loop activation.

FUEL MANAGEMENT ENGINE MANAGEMENT HEATING & COOLING DIESEL

DELPHI

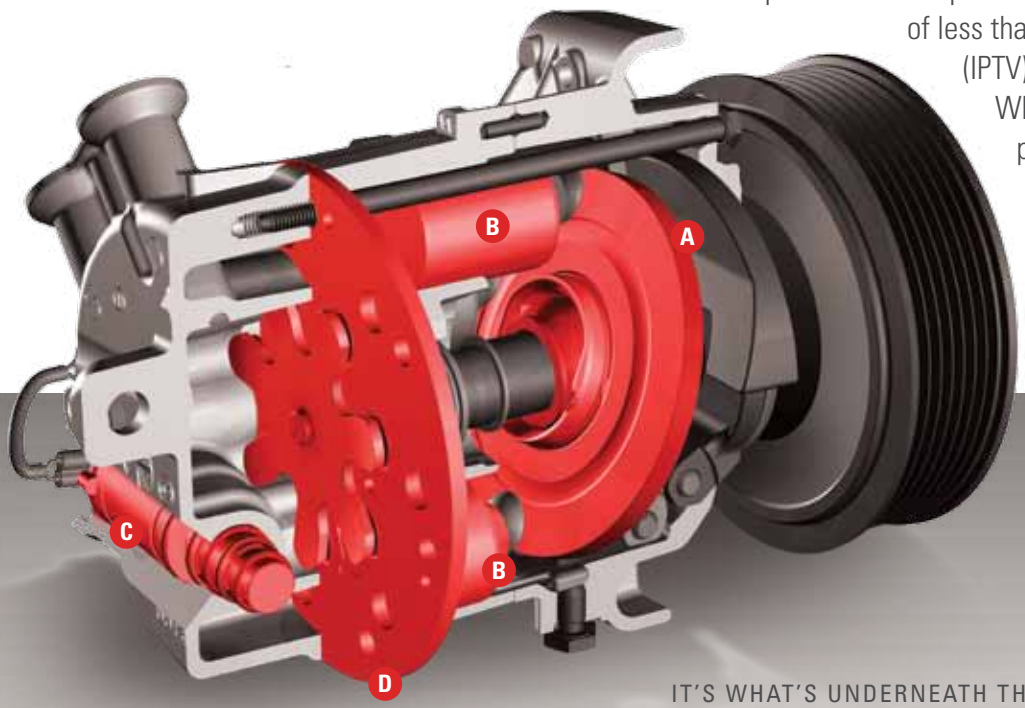
Innovation for the Real World

Delphi CVC compressors. High standards. Below the surface.

They may look the same, but all parts are not created equal.

Delphi OE CVC compressors have proven warranty experience of less than 1 Incident Per Thousand Vehicles (IPTV) on major OEM applications.

What does that mean? Reliable, high performance compressors you, and your customers, can trust. Providing you with the benefit of more than 100 years of OE heritage, we are the company that makes the parts cars are born with.



IT'S WHAT'S UNDERNEATH THAT SETS DELPHI APART

Delphi CVC Compressor // **A Swash Plate Variable Mechanism** Patented technology makes the CVC adaptable to both pneumatic and electronic control for high speed operation at up to 9200 RPM; **B Redesigned Piston** Patented technology is more durable under low charge and low flow conditions; **C Integrated Control Valve** Compact packaging and unique four-port flow design provides a wider range or control set points for impoved fuel economy, better emissions, and faster time-to-comfort; **D Reed Valve and Valve Plate** Patented design increases the durability of the reed itself and reduces noise.

delphi.com/am

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